A Proposed Framework for Integrating Entrepreneurial Education into the Secondary School Science Curriculum in Nigeria to Foster Innovation and Sustainable Development

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Abstract

In a cycle of poor implementation of the current curriculum by a systemic overemphasis on theory and abhorrent shortage of resources and trained staff, this paper presents a framework to close this gap between the educational performance of the Nigerian population and the needs of its labor market, which has also been a source of high unemployment among the youth. The paper has identified the key difference between innovation(the act of making something new) and entrepreneurship (the process of commercializing innovation into a viable business), and has argued that science education is best placed to impart both the creative and logical skills of an innovator and the business acumen, resilience, and discipline of an entrepreneur. The paper ends with practical proposals of action that policy makers and educators can take to improve entrepreneurial motivation and skills of their students, not only to get hired in the traditional manner, but also to be self-reliant and create jobs.

Keywords: Entrepreneurship Education, Science Education, Curriculum Reforms, Skill-Based Education, Innovation

1.0 Introduction

1.1 How Skill-based Education is an Imperative in Nigeria.

Nigeria is having major challenges that have significantly influenced the economic and social situation in the country, with the unemployment of the youth and university graduates being the most defining (Audu and Ajayi, 2022; Adewoye and Sodipo, 2016). The current state of the society has created a general dissatisfaction with the relevance of the education system among the population, which is now commonly seen as a source of graduates with unmarketable skills and expertise in the labor market (Adewoye & Sodipo, 2016). There is a structural mismatch between the and the requirements of the labor market that are dynamic and quickly shifting, which has impeded the national development process

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and increased socio-economic issues such as poverty (Audu & Ajayi, 2022; Adiele, 2010; Maina, 2014).

The Nigerian education system had historically been criticized due to its excessive focus on theoretical concepts and rote learning, which is a method of pedagogy that has been referred to as a mechanical delivery with minimal practical and hands-on interaction with real-world issues (Adiele, 2010; Maina, 2014). This model does not provide higher-order skills that a knowledge-based economy requires, including critical thinking skills, problem-solving skills, and flexibility (Audu and Ajayi, 2022). Therefore, the entrepreneurship has become an important source of alternative to traditional employment, providing the way to self-reliance and the establishment of new possibilities (Audu & Ajayi, 2022). The timeless quality of this issue indicates that the significant curricular and pedagogical change is required that aims to consciously fill in the gap between the study and practice. It is a requirement of better timing as well as a necessary reform then as a curriculum that emphasizes some skills that are marketable, as opposed to merely abstract concepts.

1.2 The Nexus of Science, Innovation and Entrepreneurship.

Science, innovation, and entrepreneurship are not separate entities, quite the contrary, they are connected in both an inherent and symbiotic manner. Innovation is the creative process of bringing something new, be it a product, service, business model, or even a new idea (Goleman and Senge, 2016). An innovator is the creative thinker that discovers a superior method of doing something (Goleman and Senge, 2016). By comparison, entrepreneurship is the process-oriented science of converting an interesting idea or innovation into a potential business opportunity that will be profitable and sustainable (Goleman and Senge, 2016; Okafor, 2025). It is a mutual connection: a good business is usually built on an innovation and is taken to the heart of an entrepreneur (Goleman and Senge, 2016). The innovator is the one who comes up with the what and the entrepreneur with the how. The science education and especially science education at the secondary level is in a singular position to develop knowledge necessary to become innovative. Students of science are perfectly adapted to the entrepreneurial pathway since their education prepares them to possess the following attributes: logical thinking, a disposition towards research, and the ability to think in an abstract manner (Okafor, 2025). They are trained to be observant, trial and error and to perceive openings where others might perceive dead ends (Goleman and Senge, 2016). Nevertheless, an education that revolves around the scientific process of innovation is not complete. Innovators, especially non-corporate ones, might not have the business experience, risk-taking behavior, and committed determination to be able to commercially develop their inventions (Goleman and Senge, 2016). Thus, a curriculum approach in science, which is to empower students to be on their own, cannot only stimulate innovative thinking but should also actively incorporate the most fundamental aspects of entrepreneurship to the extent that the ideas can be made real, income-generating products.

1.3 Problem and purpose of the research.

Nigeria secondary school science curriculum is formally formulated to instill ability in getting laboratory and field skills to enable them to foster entrepreneurial skills in students (Akinwumi and Jacob, 2013). However, studies constantly revealed that this curriculum is of poor quality, although

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planned well, but poorly implemented, which is explained by the systemic issues (Akinwumi & Jacob, 2013). The challenges consist of a severe shortage of insufficient manpower, resources, teaching aids, and finances, all of which are inhibitors to effective delivery (Akinwumi and Jacob, 2013; Adiele, 2010; Maina, 2014). The dislocation between the formulated policy goal of developing entrepreneurial competencies and the real-world situation of an ideal, resource-deprived education system leaves a wide gap, which will have to be filled.

This paper aims to fill this gap in knowledge by presenting a theoretical yet practical framework of incorporating entrepreneurial education into the science curriculum of secondary schools in Nigeria. The framework will integrate the effective international pedagogical practices, meet the latest national policy agenda, and provide practical advice to guarantee that the aforementioned objectives of the curriculum that include developing innovation and entrepreneurship skills will be achieved thus enabling the Nigerian students to acquire the necessary skills to survive in the global economy and contribute to the national development.

2.0.Conceptual foundations: The definition of Innovation and Entrepreneurship.

2.1 Innovation and Entrepreneurship as Differentiated.

The fundamental constructs of innovation and entrepreneurship should be clearly defined in order to create a solid structure of the integration. As already determined, the concept of innovation is essentially the process of designing or bringing something new, like an idea, commodity, or service (Goleman and Senge, 2016). The inventor is the one who represents this creativity force. They are marked by a complex of qualities that are favorable to new thinking and discovery, which includes reflective attitude, problem-solving orientation, and the capacity to identify opportunities where other people do not (Goleman and Senge, 2016; Muhammad, 2018).

Conversely, the strategic use of business skills to make an innovative idea into a valid business venture is known as entrepreneurship (Goleman and Senge, 2016). An entrepreneur is a creative person who is also knowledgeable in business principles and is ready to take risks and motivated to achieve a great result, which is profit and success (Goleman and Senge, 2016). The talent of an entrepreneur is different, yet supplementary, to the talent of an innovator. They have attributes of discipline, determination, responsibility, and the ability to handle failure as a temporary failure and not an ultimate failure (Okafor, 2025; Akintoye and Ogundele, 2020). A clear comparison of the core skills related to each of the positions is given in the following table.

Table 1: The Innovator vs. The Entrepreneur: A Comparison of Core Skills

Innovator Skills	Entrepreneur Skills
Listening, thinking, and experimenting, perceiving openings	Strong, hard, innate risk-taker, business expertise, desire to succeed.
Creative power (innovative, broadening insight, problem solver, reflective)	Sense aspect (confident, wants profit, able to serve, determined, optimistic)
Mental, intellectual, research-oriented, and logical mind	Intention (brave, risk taking, hardwork, cooperative, responsible, disciplined)
Open-mindedness, detail-oriented and analytical observation	Endurance, personal will, capacity to overcome failure, business expertise.

2.2 The Symbiotic Relationship between the Innovators and the Entrepreneurs.

Innovators and entrepreneurs have a strong symbiosis that leads to economic

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development. A business idea may be brilliant and lack the practical skills and tenacity to navigate the challenges of the business environment including attracting financing, developing a business model, and surviving the risks that are bound to happen (Goleman and Senge, 2016). It is the gap that is vital and is filled by the entrepreneur. The innovator is the person who creates something abstract and the entrepreneur introduces it to reality by making the necessary adjustments to the original concept to make it profitable (Goleman and Senge, 2016).

When it comes to Nigeria where many graduates have to self-employ, a science curriculum, which creates only innovators, but not an entrepreneurial mindset is an essential failure (Audu & Ajayi, 2022). The curriculum should provide the ability to innovate as well as the ability to commercialize. The latter is the only reason why the most innovative scientific findings can be converted into socio-economic gains. The curriculum should then serve as a launch pad and deliver not only scientifically creative but also determined, hardworking, armed with the hands-on business experience to transform their creative ideas into practical businesses thereby earning income and job opportunities.

2.3.Developing the Entrepreneurial Mental Model: Theory into Practice.

Being an entrepreneur is not a set of skills but a system of values and a thinking style that is marked by innovativeness, initiative, flexibility, persistence, and a high ability to learn through mistakes (Yulianti, 2018; Audu and Ajayi, 2022; Akintoye and Ogundele, 2020). This is a direct challenge to the cultivation of such a mindset because the existing state of the entrepreneurial education delivery in Nigeria is primarily driven by an overemphasized theoretical focus (Adiele, 2010; Maina, 2014). There is no opportunity to expose students to the hard realities of the business environment and would not help breed the practical resilience necessary to initiate and maintain a venture through such an approach (Adiele, 2010; Maina, 2014).

Risk-taking, discipline, and cooperative effort are the values which lie in the focus of the entrepreneurship, which cannot be trained in a lecture hall (Muhammad, 2018; Yulianti, 2018). They are instead developed in a practical, experience-driven manner that enables students to fail, make mistakes, and continue (Okafor, 2025; Adiele, 2010; Maina, 2014). The move towards a more experiential, problem-solving approach to teaching instead of the theoretical, content-delivery type approach is thus not only a pedagogical advantage but a requirement to creating the type of entrepreneurial personality that can maneuver in a high-risk business setting.

3.1 Overview of Nigeria Revised National Secondary School Curriculum.

The federal government of Nigeria, via the Nigerian Educational Research and Development Council (NERDC) has worked on a total improvement of the national curriculum, with the updated version becoming effective in the 2025/26 academic year (Alausa, 2025; NERDC, 2025; Shehu, 2025). The given objective of the reform is to decrease the overload of subjects and prioritize the development of skills, so that Nigerian students could be better equipped to the global economy by delivering the knowledge and skills necessary to achieve their success (Alausa, 2025; Shehu, 2025). This should be done through narrowing down the subjects at the Senior Secondary School (SSS) to 8-9 with more emphasis on five core subject areas, of which the Sciences will be included (Alausa, 2025;

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NERDC, 2025; Shehu, 2025).

The major modification of the new curriculum is the implementation of a compulsory subject called Trade as one of the five core subjects or compulsory to all the SSS students (Alausa, 2025). The number of trade subjects has been reduced to six useful areas with one being Solar PV Installation and Maintenance, and Computer Hardware and GSM Repairs (Alausa, 2025). This was a change of policy aimed at inoculating the education system with vocational and practical skills in a top-down approach. Yet, as the introduction of the trade subjects is a direction to follow, the main science electives, i.e. Biology, Chemistry, Physics, still stay different (Alausa, 2025; NERDC, 2025). This division offers a lost chance of synergies between the academic sciences and the trades. The main issue of interest in this paper is, how, not only an adjacent trade subject, but specifically the core science curriculum itself, can be utilized to develop one and the same entrepreneurial skills and attitude.

3.2. Objectives of Senior Secondary Science Curriculum.

The objectives of the Senior Secondary School Science curriculum in Nigeria are perfectly consistent with the requirements of a developing economy. It focuses on achieving a moderately good competence in field and laboratory skills acquisition, a process that is supposed to instill the entrepreneurial skills in the learners (Akinwumi and Jacob, 2013). Curriculum aims to enhance literacy, open new sources of revenue and employment, which consequently leads to minimizing the national security issues that have mostly been associated with poverty and unemployment (Akinwumi and Jacob, 2013). Curriculum aims to enhance literacy, open new sources of revenue and

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To ensure these objectives, the curriculum gives clear-cut illustrations on how science concepts can be put into practice in an entrepreneurial manner. In Chemistry, it is possible to connect such issues as saponification with the formation of business concepts connected with soap, detergent, or perfume production (Okafor, 2025). In the same way, electronics study can be related to repair and maintenance business through a Physics course (Akinwumi and Jacob, 2013). The reproduction lessons can be applied in practice in the Biology subject in areas like snail or fish farming (Okafor, 2025). These illustrations affirm that the stipulated policy is that science education is functional and commercially viable. The table below gives a realistic example of how these connections can be included in an ordinary science curriculum.

Table 2: Mapping Science Topics to Entrepreneurial Activities

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Science Subject	Topic	Entrepreneurial Application
Chemistry	Saponification	Soap and Detergent Manufacturing: This is a micro business that manufactures household or specialized cleaning products.
	Distillation	Perfume or Essential Oil Production: This is a business that deals with the production and sale of perfumes.
	Fermentation	Brewing or Food Preservation: Preparation of drinks, fermented products or preservations to be sold in small scale.
Biology	Reproduction in Snails	Snail Farming (Heliculture): A business that has the potential to be profitable and a high demand of its products..
	Ecology/Ecosystem	Fish Farming (Aquaculture): A farm that rears fish in a confined area that is supplied to the food market.
	Botany	Horticulture and Crop Production: This is a business where plants, flowers or crops are cultivated and sold.
Physic	Basic Electronics & Electricity	Computer/Hardware and GSM Repairs: This is a service based business that offers technical repair services on electronics.
	Solar Photovoltaic Installation	Solar Energy Business: It is a technical venture that involves installing, maintaining, and repairing solar energy systems.

3.3. Foundational Implementation Challenges Analysis.

The achievement of the implementation of science curriculum has since been undermined by a set of highly systemic, long running issues, despite the well-articulated policy objectives. Internal ones are the most invasive, and they are connected to the process of the delivery of the education itself and not external problems of policy (Adiele, 2010; Maina, 2014). The main challenges are on the one hand the acute shortage of proper manpower, resources, and instructional facilities including laboratory equipment, chemicals, and reagents (Akinwumi & Jacob, 2013). Such long-term under-investment makes the impossibility of carrying out the practical and hands-on activities, which are key to the acquisition of skills, almost unattainable and compels teachers to resort to the theoretical, mechanistic delivery that the curriculum is supposed to outgrow (Adiele, 2010; Maina, 2014).

Additionally, the large number of students to teachers in most institutions increases this issue, and it is hard to provide personal approach and hands-on mentorship (Adiele, 2010; Maina, 2014). Another challenge facing the educational system is the poor attitude of the society towards technical and vocational education, which the society perceives as inferior to the conventional academic qualification (Adiele, 2010; Maina, 2014). This would make it a cycle in that students with no zeal to learn or motivation to apply themselves in a system that has few tangible rewards would develop negative behaviors such as avoidance of classes and malpractices in examinations (Adewoye and Sodipo, 2016). Finally, the good policy idea is being compromised by a severe gap between a futuristic curriculum and the reality on the ground, which are underfunded, poorly equipped, and unsupported institutions.

3.4 The Government Policy: Nigeria Startup Act (2022) as an Enabling Framework.

Although the Nigerian education system is faced with challenges of implementation, the national policy level has a strong level of synergy that gives a sufficient reason as to why the proposed framework should be implemented promptly and in the right manner. Nigeria Startup Act (NSA), which was approved in October 2022, is an innovative law that will allow creating a favorable business climate in Nigeria and make it the leader in the sphere of digital and innovation (Faiz Bashir, 2025; Dr.

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Kashifu Inuwa, 2025; TQStem, 2023). The Act includes an extensive governance framework, a Startup Investment Seed Fund under the management of the Nigerian Sovereign Investment Authority (NSIA), and essential incentives in the form of tax exemption, grants and access to capacity-building programs of tech-enabled startups (Federal Republic of Nigeria, 2022)..

The credibility of the NSA with regard to the Digital Literacy and Skills and the objective to help commercialize new ideas implies strong induction force to entrepreneurs. The legislation offers a well-defined market and support system to the very innovators and entrepreneurs that the updated national curriculum is supposed to generate (Federal Republic of Nigeria, 2022). The presence of the Act denotes the presence of an institutional demand of the products of an entrepreneurship-mediated science curriculum. This offers an essential and opportune reason behind the reform of education. It is not a policy deficiency in supporting entrepreneurship anymore it is just a failure to generate a generation of students who possess the skills needed to capitalize on the opportunities that a statute like the NSA offers.

4.1 An Overview of Pedagogical strategies in International Curricula.

When analyzing the success of international models, it is possible to see that the process of entrepreneurial education implementation is most successful when not perceived as an independent subject. In Finnish education, as an example, the subject of entrepreneurship is taught thematically as a part of other subjects (Seikkala, 2011; Mahmudin, 2023). Based on the philosophy of a phenomenon-based learning approach, the approach promotes the exploration of real-life themes through the integration of traditional subjects, thus nurturing important skills (such as creativity, critical thinking, and teamwork) (Mahmudin, 2023;
and teamwork) (Mahmudin, 2023; FinlandWay Schools, 2025). This is aimed at going past the abstract ideas and introducing students to practical, group environments (FinlandWay Schools, 2025). Equally, the models in Canada and the United States focus on project based and experiential learning. The curriculum of Building the Entrepreneurial Mindset in Canada, specifically, is based on a three-phase process of designing, refining, and pitching a venture and the development of essential project management skills (Government of Ontario, 2025; Canadian Education Association, 2022). The American model led by such institutions as Harvard University has been able to adopt the case study approach to building the skills of students in analytical and decision making (Gragg, 1953; Christensen, 1986). These models do not only impart the content of the process of science, but the process itself, involving students in the process of finding solutions to real, local problems and creating an innovative mindset (TQS-STEM, 2023; Gragg, 1953; Christensen, 1986). These crucial international models are compared in the table below.

Table 3: International models of Entrepreneurship-Integrated Science Education

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Country/Model	Key Pedagogical Approach	Core Learning Activities	Outcome
Finland: Phenomenon-Based Learning	Acquiring entrepreneurial skills in all subjects. Focus on critical thinking,creativity and problem solving	Project based learning (e.g. make a cardboard city to learn about transport). Open-ended (e.g. pretend market play) activities and role-play	By relating topics to themes in life, students gain initiative, creative thinking, and a strong base to life long development
Canada: Entrepreneurial Mindset Curriculum	A three-step process, oriented toward the development of an entrepreneurial mindset and project management skills is an iterative process)	Designing: Ideas, research potential, prototyping. Refining: Impact analysis, problem solving, budgeting. Pitching This involves creating and pitching a pitch in order to gain support	It develops critical and creative thinking and project management and leadership skills, which equip students with success in the workplace, skilled trades, or postsecondary education.
USA:Problem based & Experiential Learning	Integrates the concept of case study and collaborative/cooperative learning to educate the process of science and acquire higher-order thinking skills (Gragg, 1953; Christensen, 1986; NSTA, 2003).	Hackathons, design and pitch competitions, and group problem solving to solve real life problems. Practical experiments and demonstrations.	Trains students to implement scientific values to build value and overcome the intricacies of the business environment (TQS-STEM, 2023; Gragg, 1953; Christensen, 1986).

4.2 Case Studies

4.2.1.Finnish,Phenomenon-Based Learning Model.

Finnish education system demonstrates a good example of thematic integration of curriculum. Instead of discussing entrepreneurship as a separate topic, it is actively embedded in everyday learning activities of all fields (Mahmudin, 2023). The most common example of this method is the phenomenon-based learning approach, where students learn about the overarching and real-life theme, i.e., climate or community, using multiple areas of knowledge simultaneously. In one case, a group of students, which is interested in transport, could create a cardboard mini city and road system with the traffic signs. By doing this, they do not only train teamwork and spatial awareness, but also unconsciously use the principles of early math and negotiation. This approach will motivate students to inquire, experiment, and work in practical environments, which will create a base of the necessary skills in the future (FinlandWay Schools, 2025).

4.2.2. Canada Entrepreneurial Mindset Curriculum.

The curriculum of Canada is based on a process-oriented method of development of an entrepreneurial mindset that is structured. It is established around a three-step, non-linear structure of designing, refining, and pitching of a venture idea. In the curriculum, there is a direct instruction in project management, including the establishment of goals and task distribution, time management, and risk. Learners are expected to come up with new ideas, prototype them to demonstrate the purpose, and refine them, which involves studying their social, economic, and ethical consequences. The last phase is the pitching, which requires building and making an attractive presentation that can garner support, which is also one of the skills that should be developed by any aspiring entrepreneur (Government of Ontario, 2025). This model is an outline of how abstract ideas can be turned into well managed and concrete projects.

4.2.3 The American Problems of Problem Based and Experiential Learning.

The United States has experienced a great change in the content-delivery model to problem-based learning and case study model in imparting the process of science as opposed to the facts alone (Gragg, 1953; Christensen, 1986; NSTA, 2003). This is a pedagogical method popularized by such institutions as Harvard which seek to build the analytical and decision-making abilities

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of a student by involving them in a critical analysis of a narrative of the science and of issues of the world (Gragg, 1953; Christensen, 1986). Events such as STEM hackathons have students team-based challenges where they are tasked with finding solutions to solve authentic local problems and pitch their findings to an expert panel. The approach renders the process of learning science more relevant and engaging, since it gives the practical context on how to apply scientific principles, hence, developing critical thinking, problem-solving, and creativity (TQS-STEM, 2023; The GIST, 2025).

4.3 Empirical Evidence on the Effect of Entrepreneurship Education.

Empirical evidence indicates that entrepreneurship education is effective. The existing literature continuously shows that the inclusion of entrepreneurship education with innovative courses has a positive and significant impact on the entrepreneurial motivation and overall performance of students (Sutanto, 2025). This is especially the case when the learning content is applied in real-life scenarios and the methods used in teaching are interactive (Al-Badi, 2024). Case studies, simulations, and group projects are among the active and experiential methods of learning that should be utilized to improve the perceived feasibility and desirability of entrepreneurship as a career by students (Al-Badi, 2024; Rideout and Gray, 2013).

In addition to the explicit desire to become an entrepreneur, the studies show that the experience and competencies gained with the help of entrepreneurial education are essential regardless of whether a graduate will become an entrepreneur or not (Rae, 2015). The amount of education is not judged in binary terms of entrepreneur and not entrepreneur but on the development of a skill set versatile, such as problem-solving, creative thinking, and resilience, which is very beneficial in any line of work (Rae, 2015). The results are a strong and evidence-based rationale of the proposed framework and help to prove that the use of curriculum innovation and integration of practical pedagogies are the effective tools of developing the skills and self-confidence of students and their proactive mindset, thus, making them prepared to face the dynamism of the labor market.

5.0.A Proposed Framework for the Nigerian Secondary Schools.

5.1.Pedagogical Approaches Reform: Theory to Practice.

A radical change of the pedagogical practices is needed to close the gap between the policy intent and the poor implementation. Existing mechanistic delivery of education, which is over-reliant on theory (Adiele, 2010; Maina, 2014), should be substituted with one based on experiential learning. These are possible by moving on to a student-based, project-based model as opposed to teacher based lectures. To take one example, rather than just delivering a lecture on the principles of circuit design, a Physics teacher could set up a group project in which students are expected to design and construct a functional prototype of a solar-powered device (e.g. a phone charger or a fan) which is one of the new compulsory trade subjects (Alausa, 2025). This strategy will enable students to own their learning and implement theoretical information in addressing tangible and concrete problems (Government of Ontario, 2025; Canadian Education Association, 2022). The students may also be expected to present their projects, explaining their business case, their target market, and their profitability potential by introducing some elements of pitch challenges, as the Canadian model

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does.

5.2 Curriculum Infusion: Entrepreneurial Concepts in Science Subjects.

The suggested system recommends the injection of entrepreneurial ideas into the current science curriculum, as opposed to a separate and independent subject. This strategy is consistent with the purpose of the new curriculum to decrease the amount of subjects taught and make learning more functional and centered. The following examples in Table 2 could be used as a guide in this integration. During one of the Chemistry classes, a lesson on distillation might be followed with a group project in which the students are to create a business plan to sell their own perfumes or essential oils. A project to explore and present a business plan on a commercial snail farm, including the initial capital and market research to a potential analysis of profitability, could be given to students in the context of a Biology lesson on reproduction in animals (Okafor, 2025). In this approach, academic material is interconnected with marketable skills in a natural manner, and the study of science is relevant and can be useful to address the economic issues of everyday life (Muhammad, 2018).

5.3 Development of Cooperative Culture of Practical Application: Project-Based and Experiential Learning.

The framework relies on a transformation of a content-delivery model to a model that enhances a culture of realistic application to succeed. Lectures do not teach the entrepreneurial qualities of resilience, perseverance, and learning how to learn a lesson but are developed in the process of trial and error (Okafor, 2025; Akintoye and Ogundele, 2020). Such an environment where this attitude can thrive will be possible through the implementation of the projects that will make students generate ideas and create prototypes and refine them based on feedback (Government of Ontario, 2025; Canadian Education Association, 2022). The example is that the student team that is developing a prototype of a new product can fail dozens of times, but the process of experimenting, analysing, and adapting will create a sense of optimism and willpower that are essential to the success of an entrepreneur (Okafor, 2025; Goleman and Senge, 2016). The learning atmosphere has to be a safe place where the students feel comfortable to fail so that they can view failure not as a final stage but as an obstacle on their way to the destination (Akintoye and Ogundele, 2020).

5.4 Teacher's Capacity Building and Professional Development.

The ability to build capacity of science teachers is the most important aspect of this framework. This is directly connected to the deficit of trained manpower due to the poor implementation of the current curriculum (Akinwumi and Jacob, 2013; Adiele, 2010; Maina, 2014). To make the proposed structure a success, educators need to go through re-training in order to become facilitators of project-based and experiential learning as opposed to content-deliverers. Although the NERDC has already provided pilot training to teachers of trade topics (Junaidu, 2025), to provide a systematic solution, there is a concerted effort to develop and finance a curriculum-related training program to core teachers of science. Current programs aimed at entrepreneurship educators in the university setting that involve different pedagogical methods such as case study method (University of Entrepreneurship, 2025) can be implemented in the school setting. To make the implementation more effective and uniform, it is necessary to have a national,

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standardized training module that would be developed as a result of cooperation between the NERDC and institutions specializing in the field of entrepreneurial education.

6.0 Overcoming the Implementation Problems in Nigeria.

Although the proposed framework is sound in its conception, it needs to be executed with a mind of the systemic problems that have plagued educational reform in Nigeria over the years. The challenges of the funding, lack of resources, the existence of the theoretical teaching culture cannot be overcome alone but a complex and integrated approach is needed.

Table 4: Critical Implementation Issues and Recommendations

Challenge	Impact on curriculum Implementation	Recommendations
Insufficiency of Financing and Resources.	It does not allow acquiring laboratory equipment, chemicals, and instructional resources and means that a theoretical teaching mode will be used.	Diversify Funding Sources: The government must set aside special and ring-fenced funds to upgrade the science laboratories and workshops. This can be added by utilizing the private sector in form of partnership and grant. The Startup Investment Seed Fund and grants, which are part of the Nigeria Startup Act, can be adjusted to fund science education infrastructure.
Excessive focus on Theory	results in the so-called mechanistic delivery that does not provide students with the opportunity to be engaged, develop practical skills, or the entrepreneurial spirit	Mandate Pedagogical Reform: Federal Ministry of Education and NERDC should enact a top-down national policy, which mandates a minimum percentage of hands-on and project based, and case study, in the science curriculum. This will be checked by conducting regular inspection of schools
Lack and inadequacy of qualified/Trained Personnel	Teachers are not trained to be able to adopt either experience based or project based learning and that makes the curriculum ineffective	Adopt a National Training Program: The NERDC needs to form a partnership with local and international education institutions to develop an obligatory, standardized teacher professional growth program in science teachers. The education should be based on new pedagogies and the ways of introducing entrepreneurial aspects to the current lesson plans
Poor Societal Attitudes	Disregards the technical and vocational education, discouraging student and parental investment in a skills-based education	Conduct Public Awareness: Profile the successful student-based projects and display the success of young entrepreneurs who have exploited their science abilities. This will prove the worth of the new model and change the attitude of people towards considering technical education as the possible and prestigious career

7.0 Conclusion and Recommendations

7.1 Summary of Findings

Nigerian education system is on a critical crossroad where there is a continuing skills gap and high unemployment of youths despite a revised national curriculum that has clear and skill-based goals. Although the identified purpose of the science curriculum in secondary school is the development of entrepreneurial abilities, the stems of the systemic issues against it are the chronic underinvestment, the shortage of resources, and the pedagogical culture of focusing on theory over practice. This report puts the deep and requisite connection among innovation (the science domain) and entrepreneurship (the commerce domain) stating that both must be nurtured as part of a curriculum to be effective. It focuses on the strategic synergy of the educational reforms of the government and the policy-facilitating environment established by the Nigeria Startup Act. This paper shows that the changes to the project-based, experiential learning are not only possible but also empirically proven to positively influence the entrepreneurial motivation, performance, and confidence of students through the analysis of successful international models in Finland, Canada, and the United States.

7.2 Recommendations

The actionable recommendations on how different stakeholders can incorporate entrepreneurship into the science curriculum of the secondary school in Nigeria can be given based on the analysis as follows:

i. **Federal Ministry of Education and NERDC**: Nationwide, standardized program of teacher professional development in the field of science should be developed and introduced. The training of teachers in the infusion of the entrepreneurial ideas and application of the project-based and

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experiential pedagogies should be the focus of this program.

ii. **The State Government:** The allocation of particular, ring-fenced funds to upgrade and maintain science lab and workshops at the secondary level schools is urgent. This will ensure the requisite infrastructure in face to face, practical learning.

iii. **School Administrators:** It is necessary that school leaders be required to incorporate a certain percentage of practical and project-based science activities into the science curriculum. This will require the change of the school culture to that which promotes and compensates hands-on use and innovative problem-solving.

iv. **Private Sector:** Businesses, specifically in the technological, manufacturing and agriculture industries, are to be encouraged to collaborate with the schools. Some of these may include mentorship, jointly sponsoring student pitch competitions, or seed investment in student-led startups.

7.3 Suggestions for Future Research and Policy Implications.

As a continuation of this study, a longitudinal study will be advised to evaluate the long-term effects of an entrepreneurship-laced science curriculum on graduate employment and entrepreneurship in Nigeria. Also, a qualitative investigation of the exact obstacles encountered by teachers of science when attempting to implement new pedagogies would offer more information about the implementation issues on ground. Lastly, it would be necessary to conduct studies on the barriers and enabling factors of female students to study science and entrepreneurship within the Nigerian background so that the education reform can be fair and inclusive.

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